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Micronutrient status of soils in Tarn Taran district of Punjab, India

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ABSTRACT

The availability of four micronutrient cations, *i.e.* Zn, Mn, Fe and Cu in the soils of all the 8 blocks of Tarn Taran district was studied. Available Zn, Mn and Fe was deficient in about 20, 23 and 6 per cent soils of the district. Cu deficiency was observed in traces and only in Tarn Taran block of the district. Zn deficiency was observed in all blocks and it ranged from 3 to 47 per cent in different blocks. Mn deficiency was high in Tarn Taran, Bhikhiwind and Khadoor Sahib; medium in Gandiwind and Chohla Sahib and least or nil in Naushehra Pannuan, Valtoha and Patti blocks.

Key words : Micronutrient status, Zinc, Iron, Copper, Manganese.

Micronutrients have come to occupy an important position in Indian agriculture from the past three decades and these have been proved indispensable for production of food grain, fodder, fiber and fruit in the country. In Punjab; the deficiency of zinc at field scale was first realized in 1969-70 and it is considered third most limiting nutrient after Nitrogen and Phosphorus. Deficiency of Manganese was observed for the first time during 1980 in wheat and berseem in the crop rotations with rice on the coarse textured soils of some villages in the state. In district Tarn Taran, Mn deficiency was observed in 1986, in a sandy loam soil in Khadoor Sahib block.

The extent of deficiency in Punjab soils for Zinc (Zn), Iron (Fe), Manganese (Mn) and Copper (Cu) was reported as 49, 17, 3 and 2%, respectively (Nayyar *et. al.*, 1990). In the soils of Amritsar district (including Tarn Taran), deficiency of Zn and Fe was 35 and 1%, respectively and no deficiency of Mn and Cu was reported in that study. In the repeat surveys, decrease in Zn deficiency, increase in Mn and Fe deficiency and no change in Cu deficiency has also been reported for some districts (Anonymous, 1996). Benbi *et al.* (2006) have quoted 36, 0.5, 4 and 5 per cent deficient soils; in available Zn, Cu Fe and Mn, respectively for the district (including Tarn Taran). In a combined study of Amritsar and Tarn Taran districts; available Zn, Mn, Fe and Cu was found to be deficient in 22, 18, 5 and zero per cent soils, respectively (Singh *et al.*, 2006). Due to the formation of Tarn Taran district in 2006; the data of this study was reanalyzed for Tarn Taran district alone. So keeping in view the importance of micronutrients and inherent variability of the soils, the data of that detailed and systematic study on the available status of Zn, Cu, Fe and Mn in the soils of Tarn Taran is reported.

MATERIALS AND METHODS

Two hundred eighty eight surface (0-15cm) soil samples representing all the 8 administrative blocks of Tarn Taran district were collected. Three villages from each block were selected and 12 samples of each village were taken for analysis. The soil samples were analyzed for pH, electrical conductivity (EC) and organic carbon content according to the standard procedures described by Jackson (1973). The texture of the soil was estimated by feel method. The available Zn, Cu, Fe and Mn were extracted by the DTPA method (Lindsay and Norvell, 1978) and determined in the soil extracts with atomic absorption spectrophotometer.

RESULTS AND DISCUSSION

Physico-chemical characteristics of soils:

The soils of Tarn Taran district, which were collected and analyzed for the purpose of this study, varied from loamy sand to clay loam in texture, having pH 6.5 to 10.2 with mean value of 8.85; EC 0.2 to 0.5 dS/m with a mean value of 0.27 dS/m and organic carbon 0.03 to 0.96% with a mean content of 0.38% (Table 1). The average values of pH, EC (dS/m) and organic carbon (%) for different blocks ranged from 7.92 to 9.26, 0.22 to 0.32 and 0.27 to 0.55, respectively. The soils of the district, in general, were light to medium in texture, neutral to alkaline in reaction, having normal salt content and low to medium in organic matter content.

Micronutrient status of soils:

Zinc:

The available Zn content in the soils of Tarn Taran district varied from 0.14 to 5.36 mg/kg with a mean value of 1.42 mg/kg soil (Table 2). Considering 0.60 mg/kg Zn